apparatus has solid walls and lacks orifices along its length. The Applicant contends that the Soichiro apparatus will not "create a substantially uniform backing pressure...within and along the substantial length of the innermost tube" as required in Applicant's claims.

Applicant also submits that an additional distinction between the present invention and the apparatus disclosed by Soichiro arises from deflection by the partition 62 of gas flowing from the pipe 5 into the tube 63. As shown in Fig. 1 of Soichiro, the horizontal surface of the partition 62 redirects gas exiting the pipe 5 to a localized region and imparts a radial velocity (perpendicular to the cylindrical axis of the Soichiro cathode) as the gas enters the first buffer 20. Soichiro claims that the offset openings in the peripheral walls of the successive partitions serve to diffuse the gas as it exits the cathode. This geometry may be expected to prevent jetting of gas out of the openings in the outer wall. However, the delivery of gas to approximately the axial center of the cathode assembly with a substantial radial velocity acts counter to the goal of creating a uniform backing pressure and resultant uniform radial gas distribution rate along the substantial length of the gas metering tube as recited in the claims of the present invention.

Because the claimed limitations discussed above are not taught or suggested by the cited reference, Applicant respectfully submits that claims 1, 6, 7, 9, 11, and 12 are now in condition for allowance.

The Examiner rejects claims 2-5, 8, 10, and 13-16 under U.S.C. §103(a) as being unpatentable over Kawakami Soichiro (JP61-37969). Applicant traverses this rejection and respectfully submits that the claims in question are patentable over Soichiro in light of the amendment to claim 1.

The Examiner relies heavily on the stated objectives of the Soichiro apparatus as the basis for this U.S.C. §103(a) rejection. Applicant respectfully submits that the Examiner has erred in judging the obviousness of the "idea" behind the present invention. The Federal Circuit has said that reducing a claimed invention to an 'idea' and then determining patentability of that 'idea' is error." 727 F.2d at 1527-28, 220 USPQ at 1024. The Soichiro apparatus differs structurally from that of the present invention as noted above in Applicant's response to the U.S.C. §102(b) rejections. As the Examiner states, no teaching or suggestion is provided by Soichiro regarding limiting

a) D_{in} and D_{eff} to within a factor of three of each other (as recited in claim 2, limiting D_{eff} to approximately equal to D_{in} (as recited in claims 3 and 14),

b)   the ratio of the outermost tube's surface area to the orifice area to greater than or equal to either 10 or 100 (as recited in claims 4 and 5, respectively),

c)   the length to diameter ratio of the innermost tube to approximately less than 70 (as recited in claim 8),

d)   the shape of the nested tube to rectangular (as recited in claim 10), or

e)   the dimensions of the metering tube elements to those recited in claim 13.

The Examiner asserts that motivation for varying the dimensions or shape of the metering tube is drawn from the level of ordinary skill in the art to accomplish the stated "Constitution" regarding supplying the reaction gas stably and uniformly. Applicant respectfully disagrees with this position, noting that the objectives stated by Soichiro apply to the cathode apparatus taught therein and not to the structurally distinct gas metering tube of the present invention.
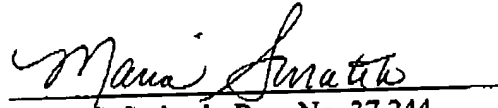
The only teachings provided by Soichiro regarding dimensions of the disclosed cathode apparatus are those at the bottom of page 7 of the submitted translation pertaining to the preceding/subsequent ratio for the diameters of the openings 13, 14, and 15 and at page 8, first paragraph referring to "a substrate whose dimension in the longitudinal direction is 300 mm." No teaching is provided regarding either absolute or relative dimensions of the nested tube diameters or regarding the desired length to diameter ratio of the innermost tube. Applicant submits that substantially uniform flow of a gas out of a cylindrical or rectangular metering tube apparatus comprising more than one nested tube each with a plurality of orifices as recited in claim 1 over a range of operating conditions is not amenable to optimization by routine experimentation by one of ordinary skill in the art. There are many variables, such as flow rate, pressure, and temperature, that must be considered. Furthermore, the structure and flow characteristics of the Soichiro apparatus and the gas metering tube of the present invention differ substantially as argued above. Soichiro teaches delivery of the gas via a solid tube at a point approximately halfway along the transverse axis. In contrast, as recited in amended claim 1, the innermost tube of the present invention is attached to a gas supply source at one end, capped at the other end, and provided with orifices along its substantial length. Applicant's invention promotes substantially uniform

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delivery of gas <u>along substantially the length</u> of the outermost tube <u>over a range of operating conditions</u>. No motivation is provided by the teachings of Soichiro to modify that prior art structure. Applicant contends that the teachings of the Soichiro reference cannot somehow be extended to motivate one of ordinary skill in the art to arrive at the specific length, diameter, and orifice size relationships recited in claims 2-5, 8, 10, and 13-16. Thus, Applicant respectfully submits that claims 2-5, 8, 10, and 13-16 are patentable under U.S.C. §103(a).

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "<u>Version with markings to show changes made</u>".

Based on the foregoing, Applicant respectfully submits that the application is now in condition for allowance. If any matters can be resolved by telephone, the Examiner is invited to call the undersigned attorney at the telephone number listed below.

Respectfully submitted,

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<u>**VERSION WITH MARKINGS TO SHOW CHANGES MADE**</u>

Please amend the claims as follows. All pending claims are included for the Examiner's convenience.

1. (Twice amended) A gas delivery metering tube for delivering a gas, comprising:

at least one innermost and outermost axially aligned, elongated, nested tubes having an effective annular space formed between said at least one innermost and outermost nested tubes, said tubes each having two ends, said innermost tube being attached to a gas supply at one end and capped at the other end;

one or more arrays of orifices formed in each of said at least one innermost and outermost nested tubes and extending along the substantial length of each of said tubes;

wherein the one or more arrays of orifices formed in said innermost tube establish a substantially uniform backing pressure along substantially the length of the innermost tube, thereby promoting substantially uniform delivery of the gas out of the orifices in the outermost tube and along substantially the length of the outermost tube over a range of operating conditions.

2. (unchanged) The gas delivery metering tube of claim 1 wherein the effective annular space has an effective diameter D_{eff} and the innermost tube has an inner diameter D_{in}, and D_{eff} and D_{in} are within a factor of three of each other.

3. (unchanged) The gas delivery metering tube of claim 2 wherein D_{eff} is approximately equal to D_{in}.

4. (unchanged) The gas delivery metering tube of claim 1 wherein a ratio of the surface area of the outermost tube to the total cross sectional area of the orifices formed in said outermost tube is equal to or greater than approximately 10.

5. (unchanged) The gas delivery metering tube of claim 4 wherein said ratio is greater than 100.

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6. (unchanged) The gas delivery metering tube of claim 1 wherein said metering tube is used in a chemical vapor deposition system.

7. (canceled) ~~The gas delivery metering tube of claim 1 wherein gas is supplied to one end of the innermost nested tube.~~

8. (unchanged) The gas delivery metering tube of claim 1 wherein the innermost tube has a length and a diameter and the ratio of the length to the diameter is in the range of approximately less than 70.

9. (unchanged) The gas delivery metering tube of claim 1 wherein the nested tubes are cylindrical.

10. (unchanged) The gas delivery metering tube of claim 1 wherein the nested tubes are rectangular.

11. (unchanged) In combination, the gas delivery metering tube of claim 1 and at least one injector assembly having at least one port for receiving said gas delivery metering tube.

12. (unchanged) In combination, the gas delivery metering tube of claim 1 and at least one shield assembly having at least one plenum for receiving said gas delivery metering tube.

13. (unchanged) The gas delivery metering tube of claim 1 wherein the innermost tube has the following properties:

$$L/D < 70$$
$$D/d \approx > 10$$
$$NA_{port}/A_{tube} \approx < 1$$

where L is the length and D is the diameter of the innermost tube, d is the diameter of one orifice in said array of orifices in said innermost tube, N is the number of orifices in the innermost tube,

A_{port} is the cross sectional area of each of said orifices, and A_{tube} is the area of said innermost tube; and

the outermost tube has the following properties:

D_{eff} and D_{in} are within a factor of three of each other

$SurfaceArea_{outer}/NA_{outer} \approx 10$ or more

where D_{eff} is the effective diameter of the effective annular space, $SurfaceArea_{outer}$ is the surface area of the outermost tube, NA_{outer} is the total cross sectional area of all of the orifices in the outermost tube, and D_{in} is the inner diameter of the innermost tube.

14. (unchanged) The gas delivery metering tube of claim 13 wherein D_{eff} is approximately equal to D_{in}.

15. (unchanged) In combination, the gas delivery metering tube of claim 13 and at least one injector assembly having at least one port for receiving said gas delivery metering tube.

16. (unchanged) In combination, the gas delivery metering tube of claim 13 and at least one shield assembly having at least one plenum for receiving said gas delivery metering tube.